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ABSTRACT

The nuclear power plant accident at Three Mile Island raised many questions concerning the safety of nuclear power plant operations and the ability of nuclear plant reactor operators to respond to abnormal or accident conditions. In response, the Nuclear Regulatory Commission (NRC) developed a plan, which included short- and long-term actions to improve nuclear power plant safety. Because of public health and safety implications, the General Accounting Office (GAO) reviewed NRC and electric utility efforts to implement the planned training and qualification improvements and found that: strong initial NRC/utility efforts resulted in a number of actions that, at least in the short term, improved the capability of personnel in the control room to adequately operate a nuclear power plant and respond to abnormal/accident conditions; since initial actions were taken, NRC's efforts have lost momentum and significant implementation problems and delays are being experienced in completing planned long-term improvements consistent with established schedules; and that NRC is relying on an industry-sponsored group to carry out most of the operator training and qualification improvements without a specific agreement covering coordination of their respective efforts. The GAO recommends two actions NRC can take to improve effectiveness of its effort to improve training and qualifications of nuclear power plant personnel. (JN)

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Problems And Delays Overshadow NRC's Initial Success In Improving Reactor Operators' Capabilities

The nuclear powerplant accident at Three Mile Island raised many questions concerning the safety of nuclear powerplant operations and, especially, the ability of nuclear power reactor operators to respond to abnormal or accident conditions. In response, the Nuclear Regulatory Commission (NRC) developed a plan, which included both short- and long-term actions to improve the safety of nuclear powerplants. GAO reviewed the progress in implementing operator training and qualification actions and found that:

--Strong initial NRC and utility efforts resulted in implementation of a number of short-term actions that should improve the safety of nuclear powerplant operations.

--Since these initial actions were taken, NRC's efforts have lost momentum and implementation problems and delays are being experienced.

--NRC is relying on an industry-sponsored group to carry out most of the operator training and qualification improvements without a specific agreement covering coordination of their respective efforts.

GAO recommends two actions NRC can take to improve the effectiveness of its effort to improve training and qualifications of nuclear powerplant personnel.

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UNITED STATES GENERAL ACCOUNTING OFFICE
WASHINGTON, D.C. 20548

RESOURCES, COMMUNITY, AND ECONOMIC DEVELOPMENT DIVISION

B-209014

The Honorable Nunzio J. Palladino
Chairman, Nuclear Regulatory
Commission

Dear Mr. Palladino:

This report discusses the Nuclear Regulatory Commission's actions to improve reactor operator capabilities which were found to be deficient by numerous investigations following the accident at Three Mile Island.

As you know a draft of this report was the subject of a public meeting of the Nuclear Regulatory Commissioners, held on July 22, 1982. Subsequent comments on the draft report received from your Executive Director for Operations are included in the report.

This report contains recommendations to you on page 25. As you know, section 236 of the Legislative Reorganization Act of 1970 requires the head of a Federal agency to submit a written statement on actions taken on our recommendations to the Senate Committee on Governmental Affairs and the House Committee on Government Operations not later than 60 days after the date of the report and to the House and Senate Committees on Appropriations with the agency's first request for appropriations made more than 60 days after the date of the report.

We are also sending copies of this report to interested congressional committees and the Office of Management and Budget. Copies of the report will also be provided to others upon request.

Sincerely yours,

J. Dexter Peach
Director

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GENERAL ACCOUNTING OFFICE
REPORT TO THE CHAIRMAN,
NUCLEAR REGULATORY
COMMISSION

PROBLEMS AND DELAYS OVERSHADOW
NRC'S INITIAL SUCCESS IN IMPROVING
REACTOR OPERATORS' CAPABILITIES

D I G E S T

On March 28, 1979, the United States experienced the worst accident in its history of commercial nuclear power generation. The accident at Three Mile Island 2 (TMI) triggered a series of studies and investigations to determine the causes and actions that could be taken to prevent such accidents from occurring in the future. These investigations showed, that although the accident was initiated by mechanical malfunctions in the plant, the fundamental cause was operator error. (See p. 1.)

In response to the TMI investigations, the Nuclear Regulatory Commission (NRC) developed an Action Plan containing both short-term and long-term actions to improve nuclear power plant safety. Part of the Plan addressed the training and qualifications of reactor operators and other key control room personnel. Because of the public health and safety implications, GAO reviewed NRC and electric utility efforts to implement the planned training and qualification improvements and found that:

--Strong initial NRC and utility efforts resulted in a number of actions that, at least in the short term, improved the capability of personnel in the control room to adequately operate a nuclear power plant and respond to abnormal or accident conditions.

--Since the initial actions were taken, NRC's efforts have lost momentum and significant implementation problems and delays are being experienced in completing planned long-term improvements consistant with established schedules.

--NRC is placing great reliance on an industry sponsored organization--the Institute of Nuclear Power Operations (INPO)--to perform the necessary groundwork for several of the remaining planned improvements to the program. However, unless NRC monitors INPO's efforts more

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Tear Sheet

closely than it has been in the past, it may not be prepared to readily adapt NRC's work as a basis for establishing its own requirements.

INITIAL NRC AND UTILITY ACTIONS IMPROVED OPERATIONAL SAFETY

Within 2 years of the TMI accident, NRC required, and utilities implemented, several actions to improve and strengthen the training and qualifications of reactor operators and other key control room personnel. The majority of the actions focused on

--improving the capability of control room personnel to recognize, diagnose, and respond to abnormal events (see p. 5);

--upgrading the training programs for reactor operators and other key control room personnel (see p. 8); and

--strengthening the qualifications and examination criteria for reactor operators. (See p. 7.)

NRC considered these actions to be short-term or interim solutions to the problems identified by the TMI investigations. They were to serve as a basis from which long-term improvements could be developed and implemented. Except for one case--providing additional operating personnel--the utilities experienced few problems in implementing the requirements in a timely manner. GAO believes these short-term actions should result in improved safety at nuclear power plants.

LACK OF NRC ACTION NOW CAUSING IMPLEMENTATION PROBLEMS AND DELAYS IN THE TRAINING AND QUALIFICATION PROGRAM

After the initial actions were taken, NRC's operator training and qualification program began to lose momentum and implementation problems and delays started to occur. GAO identified two problems. First, NRC did not review utilities' plans for revising their training programs in a timely manner. Consequently, utilities implemented the training

programs without the benefit of any review or feedback information from NRC. As a result, the failure rates of operators taking the NRC licensing examination increased, thus, indicating the programs were inadequate or inconsistent. The utilities then had to revise their training programs a second time, which added to the utilities' training costs. (See p. 11.)

Second, most of NRC's more important planned long-term actions are well behind schedule. This slippage occurred in part because NRC did not recognize the importance of completing the initial first step of its long-term program--an analysis of the duties and responsibilities of key power plant personnel. This analysis was needed to serve as a basis for completing other major long-term actions. For example, between March 1980 and June 1981, NRC changed its views several times on the general educational requirements for operating personnel. This constant changing--caused by the lack of a job task analysis--has adversely affected some utilities. (See p. 13.)

Delays are also due to NRC's decision to carry out the program using its existing organizational structure. This led to confusion over which NRC groups had primary responsibility for specific actions and even when the responsibility was clearly assigned, staff was not always available to perform the necessary work because of competing work priorities. (See p. 15.)

INPO'S ACTIONS HAVE LESSENED IMPACT OF NRC'S IMPLEMENTATION PROBLEMS

The impact of NRC's implementation problems may have been lessened by INPO, which assumed a leadership role in assuring that the capabilities of control room personnel are improved in accordance with NRC's Action Plan. INPO is currently performing the first step of NRC's long-term program--a generic position task analysis for key personnel--and eventually plans to complete many programs similar to the NRC long-term actions which are currently behind schedule. Meanwhile, NRC is monitoring, to some extent, INPO's work and is revising its schedule for completing its tasks to more closely correspond to INPO's time frames. In addition, NRC is now performing a complementary task analysis which should help it assess INPO's efforts. (See p. 19.)

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GAO sees nothing wrong with NRC relying on INPO to help complete its program. Until recently, however, NRC's monitoring efforts were sporadic. NRC was not closely involved with the INPO work, nor was it closely evaluating this work. While NRC has recently taken steps to provide additional coordination with INPO and has established an overall agreement for coordination between the two organizations, it still has not developed a specific agreement for coordinating programs in the area of operator training and qualification. NRC needs to monitor INPO's work so it will be in a position to determine whether the results of INPO's work are adequate and useful for NRC's regulatory purposes. At the same time, NRC must remain sensitive to the fact that INPO is an entity of the utilities which NRC regulates. (See p. 20.)

NRC EXECUTIVE DIRECTOR FOR OPERATIONS' COMMENTS AND GAO'S EVALUATION

Comments of NRC's Executive Director for Operations and GAO's evaluation are contained in appendix I. GAO obtained unofficial comments from INPO and made changes where appropriate.

The Executive Director disagreed with our findings that (1) NRC's efforts have lost momentum, and (2) NRC is placing great reliance on INPO without adequate NRC oversight of INPO's work.

The Executive Director stated that the NRC staff "has indeed, moved vigorously to be responsive to the issues surrounding operational safety while attempting to be responsive to the issues raised in the Action Plan." With respect to the training and qualification portion of the Action Plan, GAO disagrees. Since issuance of the Action Plan and the short-term requirements in early 1980, NRC has done very little to address the most significant cause of the TMI accident--training and qualifications of reactor operators and other key personnel. The long-term Action Plan items which address these important areas are behind schedule and must await completion of a job task analysis before an effective program can be implemented.

RECOMMENDATIONS TO THE CHAIRMAN, NUCLEAR REGULATORY COMMISSION

CAC recommends that the Chairman, Nuclear Regulatory Commission:

--Develop a specific agreement for coordinating NRC and INPO activities related to operator training and qualification which will permit NRC to keep abreast of the direction, quality, and progress of INPO's work while recognizing the sensitive relationship between NRC and INPO.

--Review all revised training programs developed by the utilities, correct any deficiencies before approving the programs for implementation, and audit the implementation of these programs within 1 year from the date of implementation to ensure that they are providing effective training to the key control room personnel.

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ABBREVIATIONS

GAO	General Accounting Office
INPO	Institute of Nuclear Power Operations
NRC	Nuclear Regulatory Commission
TMI	Three Mile Island

CHAPTER 1

INTRODUCTION

On March 28, 1979, the United States experienced the worst accident in its history of commercial nuclear power generation. The accident at the Three Mile Island 2 (TMI) nuclear power plant raised serious concerns, nationally and internationally, about the safety of nuclear power. It also triggered a series of studies and investigations to determine the causes of the accident and actions that could be taken to prevent such accidents from occurring in the future.

These investigations showed that, although the accident was initiated by mechanical malfunctions in the plant, the fundamental cause of the accident was operator error. Many factors contributed to the inappropriate actions of the operators, including deficiencies in training programs, operating procedures, and control room design.

NUCLEAR REGULATORY COMMISSION'S ACTION PLAN

In response to the TMI investigations, the Nuclear Regulatory Commission (NRC) established a task force which reviewed the recommendations made in the investigative reports. The task force identified over 340 major actions NRC should take to resolve the problems identified by the investigations, including 65 related to nuclear powerplant personnel training and qualification. These actions were further broken down into about 6,000 specific actions for implementation by utilities and review by NRC. They also categorized, prioritized, and set specific time frames and resource requirements for each action. In May 1980, the NRC Commissioners approved the final plan entitled "NRC Action Plan Developed as a Result of the TMI-2 Accident" (Action Plan). This approval provided the direction NRC was to take in solving the problems identified by the TMI investigations.

A major portion of the Action Plan was directed at improving operational safety. This category of planned actions focused on specific measures that NRC and utilities could take to strengthen and improve the training and qualifications of reactor operators and other key nuclear power plant personnel.

The operational safety actions recommended in the Action Plan were directed at making short-term as well as long-term improvements to power plant safety. The short-term actions were specific improvements intended to provide immediate relief to a number of problems that contributed to the TMI accident. Basically, these actions were either "quick fixes" or interim measures that, at least in the short term, would improve the capability of power

plant operating personnel to deal with routine operations and abnormal accident conditions. For example, the TMI investigations showed that training programs for control room personnel were deficient in certain areas such as heat transfer and fluid flow. Consequently, one recommended short-term action was to provide immediate training in these areas to control room personnel. On March 28, 1980, NRC issued a letter to each nuclear power utility which specified the short-term requirements and instructed utilities to implement most of these requirements by March 28, 1981.

The long-term actions recommended in the Action Plan were directed at upgrading the general skills and knowledge that operating personnel need to operate a nuclear power plant. Like the short-term actions, these long-term actions originated from problems identified in the TMI investigations, but additional time and studies were required to determine and develop the specific actions that would be needed to resolve these problem areas. For example, one long-term action was to upgrade the training programs for control room personnel. This upgrading was to include not only the additional training courses recommended in the short-term actions, but also any additional courses subsequently found by NRC to be needed. According to the Action Plan, NRC was to require utilities to develop and implement the majority of the long-term actions by the end of fiscal year 1982.

INSTITUTE OF NUCLEAR
POWER OPERATIONS (INPO)

In an effort to strengthen and improve the training and qualifications of reactor operators and other key control room personnel and to prevent future accidents from occurring, utilities also took actions in response to TMI. Perhaps the most significant action was the establishment in 1979 of INPO--a non-profit organization funded by nuclear utilities. INPO was primarily created to assist utilities in improving the safety of operations at nuclear power plants. One way INPO was to improve operational safety was by developing industry wide "benchmarks of excellence" in nuclear operations that utilities would strive to meet. These benchmarks, which were to represent the best performance, thinking, and experience of the industry--would be "best practices" rather than minimum standards and would serve as criteria against which utilities could be evaluated. INPO also was to conduct independent evaluations of nuclear power plants to assist the plants in meeting the benchmarks. Although INPO has no legal authority to enforce any standards it may establish, it does expect to get full cooperation from the utilities because of the vested interest utilities have in avoiding future accidents.

OBJECTIVE, SCOPE, AND METHODOLOGY

In view of the importance of having adequately trained and qualified nuclear reactor operators and other key control room personnel, the overall objective of this review was to determine NRC's progress and problems in improving operational personnel training and qualification programs at nuclear power plants since the TMI accident. Specifically, we wanted to

--determine the improvements to reactor operators' and other key control room personnel's training and qualification program recommended by the TMI investigations;

--identify actions NRC and/or utilities have taken to improve training and qualifications of nuclear power plant operators and other key personnel;

--determine the progress and problems that NRC and the utilities have experienced in implementing improvements in the operator and other key personnel training and qualification program; and

--determine what actions, if any, NRC could take to implement the necessary improvements in an effective and timely manner.

Our audit was performed in accordance with generally accepted government auditing standards.

We accomplished the first objective by analyzing the TMI investigative reports and NRC's approved Action Plan to identify the recommended actions pertaining to the training and qualification program of control room personnel. Our review was limited to reviewing those items of the Action Plan relating to the training and qualifications of powerplant operators because, as we discussed earlier, the fundamental cause of the accident at Three Mile Island was operator error. Thus, in our view, actions to correct this problem--as set forth in the Action Plan--should have received high priority.

We also reviewed a prior GAO report 1/ on TMI, which specifically addressed the adequacy of NRC's Action Plan and assessed whether it included all the significant recommendations made by the various TMI reports. In that report, we concluded that if the planned actions were properly implemented, the problems identified by the TMI investigations should be resolved.

1/"Do Nuclear Regulatory Commission Plans Adequately Address Regulatory Deficiencies Highlighted By the Three Mile Island Accident?" EMD-80-76, May 27, 1980.

The next two objectives are closely related in that actions taken by NRC and or utilities relate directly to the progress and problems encountered in implementing the planned actions. To satisfy these objectives, we interviewed officials and reviewed program files at NRC headquarters in Bethesda, Maryland, to determine (1) the requirements that NRC has issued to nuclear power plant owners, (2) progress in implementing the requirements, (3) problems experienced in implementation, and (4) actions planned to resolve the problems noted. We also visited five nuclear power plants, each of which was operated by a different utility company, to determine how the utilities were implementing the NRC requirements and the problems they were experiencing. Two of the plants were located in Alabama and the remaining three in South Carolina, Florida, and Georgia.

In addition, we visited the NRC training center at Chattanooga, Tennessee, to obtain information on how NRC trains its inspectors to assess plant safety and also to get a general understanding of how simulators 1/ are used in training programs. We also visited the NRC contractor at Oak Ridge, Tennessee, responsible for administering the licensing examination for power plant personnel, to obtain their views and opinions on the present problems in the examination process and the plans, if any, to correct the problems. Finally, we visited INPO in Marietta, Georgia, to determine specific actions they were taking to improve the quality of operator training and qualifications programs.

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Chapter 2 discusses the initial NRC and utility actions taken to improve operational safety in the short term. Chapter 3 discusses how the subsequent lack of management attention by NRC is causing implementation problems and delays. Chapter 4 discusses how NRC is relying on INPO to develop a major part of its program. Chapter 5 presents our conclusions and recommendations for the matters discussed in this report. Finally, appendix I presents comments by NRC's Executive Director for Operations on a draft of this report.

1/A simulator is a duplicate control panel for a particular plant that is used in training reactor operators. The control panel is connected to a computer that is programmed to respond to specific manipulations and to simulate responses of the real plant systems.

CHAPTER 2

INITIAL NRC AND UTILITY ACTIONS

IMPROVED OPERATIONAL SAFETY

Within 2 years of the TMI accident, NRC required utilities to take a number of short-term actions to improve and strengthen the training and qualifications of reactor operators and other key control room personnel. The utilities have implemented the actions, and NRC's Office of Inspection and Enforcement has verified the implementation. While some of the utilities we visited expressed minor difficulty in implementing some of the actions, the only major problem that has occurred was the utilities inability to meet NRC time frames for providing additional reactor operators.

The short-term actions not only provided temporary solutions to the problems identified by the TMI investigations--thereby immediately increasing the safety of nuclear reactors--but also served as a basis from which long-term improvements would be developed and implemented. Thus, these actions, while considered "short-term," should have a lasting affect on the quality of operator training and qualifications. The majority of these actions focused on

--improving the capabilities of control room personnel to recognize, diagnose, and respond to abnormal events;

--upgrading the training programs of reactor operators and other key control room personnel; and

--strengthening the qualifications and examination criteria for reactor operators.

CAPABILITIES OF CONTROL ROOM PERSONNEL IMPROVED

One of the most significant causes of the TMI accident was the inability of control room personnel to recognize, diagnose, and respond to abnormal events. To immediately improve the capabilities of these personnel until planned, long-term actions could be implemented, NRC required utilities to (1) have additional personnel with greater expertise in the control room to advise and assist reactor operators in the event of an accident and (2) develop procedures to improve the feedback of information from prior operating experience.

An NRC special inquiry into the TMI accident 1/ concluded that the operators on duty had not been adequately trained to recognize and respond to a serious accident during the first hour or two after it occurred. The inquiry also concluded that neither the operators nor their supervisors possessed the necessary combination of technical competence and familiarity with the plant to diagnose an unanticipated situation and take appropriate corrective action. To immediately resolve this situation, NRC required utilities to have a technical advisor with engineering expertise on each shift during plant operations to advise and assist control room personnel in the event of an accident. NRC anticipates this requirement may be eventually eliminated as the qualifications for control room supervisors are upgraded and control room designs are improved.

The special inquiry also found that NRC's minimum staffing requirements did not ensure that enough qualified personnel were available at the plant to respond to any abnormal or emergency condition. Prior to the TMI accident, NRC required a minimum of one senior reactor operator, two reactor operators, and two auxiliary operators available at the plant to operate the reactor. However, only one reactor operator was required to be in the control room at any given time. To assure that enough qualified individuals are readily available to respond to any abnormal or emergency situation, NRC required as of July 1, 1982, that a senior reactor operator be in the control room at all times in addition to the reactor operator previously required. In addition, utilities are also required to have onsite, at all times, an additional relief operator for each reactor, a senior reactor operator who is designated as shift supervisor, and other additional senior reactor operators so that their total is at least one more than the number of control rooms from which the reactors are being operated. However, 31 percent of the nuclear power plants were unable to meet the July 1, 1982, deadline for having these additional licensed operators available. Consequently, NRC extended this completion date to January 1, 1983.

The collection, assessment, and feedback of operating experience have always been recognized as an integral part of assuring the safety of nuclear facilities. For example, the accident at TMI had almost happened twice before--at plants in Switzerland in 1974 and in Ohio in 1977--but in both cases operators diagnosed and solved the problem in a matter of minutes before serious damage was done. However, because an effective system for providing operating experience to other nuclear facilities was lacking, these two incidents were never communicated to TMI operators. Consequently, when they faced similar accident conditions, the TMI operators did not react properly.

1/"Three Mile Island, a Report to the Commissioners and to the Public, Volume 1," NUREG/CR-1250, January 1980.

Since the accident, NRC has directed--and utilities have implemented--procedures to assure that operating information pertinent to plant safety--such as nuclear power plant incidents originating both within and outside the utility organizations--is continually supplied to utilities and incorporated into operator training and retraining programs. These procedures should improve control room personnel's capabilities to recognize accident conditions, diagnose its cause, and respond in a more effective and efficient manner.

OPERATOR QUALIFICATIONS AND EXAMINATION CRITERIA STRENGTHENED

NRC requires that operators meet certain qualification standards and also pass an examination before they operate a power reactor. The TMI investigations concluded that NRC's minimum operator qualification and examination criteria needed to be improved. In response to this finding, NRC made the operator qualification and examination criteria more stringent. Reactor operators and senior reactor operators are now required to have additional on-the-job training and experience, and the passing grade for the licensing examination has been increased.

Prior to TMI, senior reactor operators were required to have a high school education or equivalent and 4 years of responsible power plant experience, at least one of which had to be in a nuclear power plant. NRC expanded these requirements so that senior reactor operator license applicants must now have 2 years experience in a nuclear power plant--at least 6 months of which must be at the plant for which the license is sought. Applicants must also have a reactor operator's license for at least 1 year, serve 3 months of shift training as an extra man on shift, and complete an operating examination in addition to the written examination.

As before the TMI accident, reactor operator applicants must have a high school education, or equivalent, and 2 years of power plant experience, at least one of which is at a nuclear power plant. However, applicants must also now serve 3 months training as an extra person-on-shift in the control room.

NRC also established more stringent licensing examination criteria for all operators by requiring simulator testing as part of the examination, setting time limits for completing the written examination, adding several new areas, and raising the passing grade to 80 percent overall with at least 70 percent in each of 8 categories. Prior to TMI, there were no time limits, the passing grade was 70 percent overall, and low grades in individual categories were informally noted but no retraining was required. According to a Congressional Research Service study, if the new criteria had been applied to examinations between January 1977 and March 1979, 49 percent of the applicants for an operator's license and 40.3 percent of the

applicants for a senior operator's license would have failed the examination. Under the old criteria, the failure rates were 5.7 percent and 4.1 percent, respectively.

OPERATOR TRAINING PROGRAMS UPGRADED

TMI studies showed that inadequate operator training was a major contributor to the TMI accident. In recognition of this problem, utilities have made a substantial commitment toward upgrading operator training programs by increasing the quantity and quality of training provided to reactor operators and other key control room personnel. Although the majority of these actions were in response to specific NRC requirements, some of the improvements were initiated by the utilities.

Prior to TMI, NRC required control room operators to have only a limited amount of training in sophisticated engineering and physics principles necessary to understand the thermal-hydraulics of the reactor's primary system. The TMI accident illustrated that this limited amount of training did not give operators adequate knowledge of the way safety systems interact and the phenomena they could expect to see on their instruments from abnormal conditions.

In response to these findings, NRC required utilities to include in their operator training programs courses in five technical areas, which caused or contributed to problems at TMI. Furthermore, NRC required that requalification programs, which all operators are required to take on an annual basis, be revised to include specific reactive manipulation of reactor controls. NRC also required training instructors at utilities to demonstrate their competence by successfully completing a senior reactor examination and enrolling in an appropriate requalification program.

An NRC official told us that many utilities were already in the process of revising their training programs before the requirement to do so was issued by NRC. For example, one utility, which had a 22-month operator program in effect, increased its program to 26 months because of its own investigation subsequent to TMI. The impact of this increased emphasis on training is also evidenced by increases in training staffs at individual utilities. For example, the training staff at one utility we visited consisted of one instructor and one supervisor prior to TMI but has since been expanded to 11 instructors, 2 nuclear training specialists, and 8 supervisory and administrative positions. The training staff at TMI has also been substantially increased--from 7 to 51 positions since the accident.

The increased awareness by utilities of the importance of proper training is further evidenced by actions taken by

a number of utilities in anticipation of future NRC requirements. For example, the five utilities we visited are using simulators for training, four of which either had a training simulator on hand or plans to obtain one. Some utilities are also providing training courses for management personnel and other non-licensed personnel (such as maintenance personnel). These tasks are included in NRC's long-range plans, but as of yet, are not required by NRC.

As discussed in the next chapter, however, NRC as part of its long-term efforts, did not follow-up on utility efforts to improve their training programs, and as a result, some of the programs implemented were inconsistent and, in some cases, inadequate. Nevertheless, based on our visits and discussions with NRC and utility officials, the actions taken by utilities to strengthen the training programs are in accordance with NRC's Action Plan and should result in improved safety at nuclear power plants.

CHAPTER 3

LACK OF NRC ACTION NOW CAUSING IMPLEMENTATION PROBLEMS AND DELAYS

The improvements discussed in chapter 2 were immediate or quick fix actions which NRC believed would improve operational safety at nuclear power plants in the short term. These actions were not intended to resolve the problems in the long term but serve as stop gap actions until research and studies could be performed to develop and implement a long-term program. However, as time passed, the program lost momentum and numerous implementation problems and delays started to occur. These problems are concentrated primarily in two areas.

First, as a result of the short-term requirements, utilities were to revise their operator training programs and submit them to NRC for review. The utilities complied in a timely manner, but NRC did not start its review for 1-1/2 years after the revised training programs were received. This delay on NRC's part resulted in utilities' implementing revised training programs which are inconsistent and in some cases inadequate.

Second, most of NRC's planned long-term actions are well behind the schedule set forth in the Action Plan as approved by the Commissioners. This slippage occurred for two reasons. First, NRC only recently recognized the importance of completing the vital first step of its long-term program--an analysis of duties and responsibilities of key power plant personnel. This analysis is needed to serve as a basis for completing other major long-term actions. Second, although operator error was the fundamental cause of the TMI accident, NRC did not establish--and isolate from other duties--a specific group to develop long-term nuclear powerplant personnel training and qualification requirements. Instead, NRC assigned responsibility for carrying out these long-term activities to existing organizational components. According to an internal audit report, the organizational format resulted in confusion over how the Action Plan should be implemented. In addition, competing demands on NRC staff time further contributed to NRC's inability to carry out planned actions in a timely manner. Recent NRC initiatives aimed at better coordinating its work with ongoing work of INPO should help alleviate this situation.

The delay in establishing long-term requirements has already adversely affected and confused utilities in one area--educational requirements for operating personnel.

NRC DID NOT REVIEW AND PROVIDE FEEDBACK FOR SHORT-TERM TRAINING

Probably the most important short-term requirement imposed by NRC on the utilities was the need to immediately upgrade reactor operator and senior operator training programs. As discussed in chapter 2, the upgrade was to improve the capability of operators and supervisors to understand and control complex reactor problems and accidents, such as those experienced during the TMI accident, and to improve the general capability of plant operations personnel to respond rapidly and effectively to abnormal conditions. Unlike most of the other short-term requirements implemented by the utilities, this one required more than a simple verification by NRC that it was in place. It required that NRC review the adequacy of the programs and provide feedback for improving them.

To implement this requirement, the Action Plan directed NRC's Office of Nuclear Reactor Regulation to require all operating plant licensees and all license applicants to develop and submit, by August 1, 1980, revised training programs for operators and other control room personnel. The plan also directed the Office of Nuclear Reactor Regulation to review the contents of the revised training programs. According to an NRC official, the purpose of the review was not only to ensure that the training programs were adequate and capable of providing the proper training, but also to provide, through feedback to the utilities, post-implementation guidance for improving training program content and structure.

Our review showed that all the utilities complied with the August 1, 1980, deadline. However, NRC did not review the revised training programs and subsequently contracted for the reviews starting in January 1982, about 1-1/2 years after they received them. The contractor has finished the review of all the revised programs and submitted a technical evaluation report for each one to NRC. NRC is now reviewing these reports and will prepare a safety report noting any open or questionable areas. The open or questionable areas will then be submitted to the utilities for action. NRC expects to complete the process by the end of 1982. As a result of NRC's delay, utilities have implemented their training programs without the benefit of any review or feedback information from NRC. NRC's Office of Inspection and Enforcement did verify that the utilities had implemented their revised training programs, but did not evaluate the quality of these programs. NRC later found that, based on results of its licensing examination, many of these programs were inadequate or inconsistent.

The then chief of NRC's operator licensing branch told us that earlier NRC review, as contemplated in the Action Plan, was not critical because deficiencies in any program would show up when operators took the NRC license examination. However, this approach by NRC caused utilities delays in establishing improved

training programs and resulted in training program and operator licensing problems for the utilities which could have been avoided.

For example, an official at one utility we visited told us that NRC should have not only reviewed the revised programs, but also provided some specific guidance and criteria to assist utilities in developing adequate training programs that were reasonably consistent with other utilities' programs. Without such guidance or review, according to officials of the utilities we visited, utilities had to develop their training programs using consultants and information available from INPO, nuclear equipment vendors, or their own technical staffs. This contributed to inadequate training for some operators, increased failure rates on the licensing examination, and additional costs to utilities when they had to make additional revisions to their training programs.

The lack of NRC guidance and review in implementing the revised training programs caused particular problems for utilities in preparing applicants for NRC's licensing examination, which is formulated, administered, and graded by NRC. As discussed in chapter 2, NRC revised this examination as a result of TMI to include several new areas. Without criteria or guidance, the utilities were at a disadvantage in training their personnel for the revised examination. Even more important, NRC's short-term requirements provided that not only new license applicants be trained and examined in the new areas, but also the current licensed operators be trained in the area. Consequently, the licensed operator received the same training as those applying for a license.

The overall failure rate went from 10 percent prior to TMI to 30 percent after the licensing examinations and training programs were revised. While some of the increased rate may have been due to more stringent examination criteria, the former chief of NRC's operator licensing branch told us that the increased failure rate occurred largely because applicants had difficulty with the new areas of the examination, an indication that deficiencies in the revised training programs existed. In addition, we noted that some plants had an extraordinarily high failure rate. For example, at one plant in Arkansas, 67 percent of the operators failed the NRC examination. NRC investigated the high failure rate and found that the revised training program was inadequate. The Acting Director of NRC's Division of Human Factors Safety told us that if NRC had reviewed the revised training program earlier, the problem could have been identified, corrected, and the situation probably would not have occurred. In fact, after an NRC investigation at the Arkansas plant, the training program was restructured to correct the deficiencies and, upon reexamination, all the operators passed.

In a similar situation, the majority of reactor operators at the TMI plant failed an NRC examination which was given to operators for the startup of the undamaged power reactor. Prior to the examination, NRC assumed that the training program was adequate because of all the attention focused on the plant. However, deficiencies did exist and were discovered through the NRC examination process. Subsequent action was taken by the utility to improve its training program, and the deficiencies have been corrected.

NRC HAS MADE LITTLE PROGRESS IN IMPLEMENTING LONG-TERM IMPROVEMENTS

Although the short-term actions required by NRC improved the utilities' operator training and qualification program, the heart of NRC's program is the implementation of long-term actions, generally intended to upgrade the overall skills and knowledge that operating personnel need to operate a nuclear power plant. NRC has made little progress at implementing these long-term actions and, consequently, few improvements--beyond the short-term actions already taken--have been made to the training and qualification programs for reactor operators and other key control room personnel. The primary reason was that NRC did not recognize the need to complete an analysis of the duties and responsibilities of key power plant personnel which would serve as a basis for making other long-term improvements.

The purpose of such a position task analysis is to identify the specific duties and responsibilities of each key power plant position, and from these results, establish standards and criteria for training and qualifications. These results would then enable NRC to develop and implement the other major long-term improvements identified in the Action Plan. These include

--restructuring the education, experience, and training requirements for operators, senior operators, supervisors and other personnel in the operations organization to substantially improve their capability to perform their duties;

--establishing definitive instructional requirements for a course in nuclear power fundamentals;

--developing criteria and procedures to be used by NRC in auditing training programs;

--establishing requirements for accrediting training institutions to improve the capability of operations personnel; and

--revising the scope of the licensing examination and the criteria for issuing reactor operator and senior reactor operator licenses.

NRC planned to accomplish the task analysis work by requiring each licensee to perform an analysis of all key power plant positions, and then review its training program and provide sufficient assurance that the training was commensurate with the safety related function of each position. However, because power plant positions are generally consistent throughout the country, NRC stated in its Action Plan that the task was amenable to a generic approach. The Action Plan also stated that the Office of Nuclear Reactor Regulation was to issue the requirement for this task to licensees by October 1, 1980, with a completion date of January 1982. This requirement was never issued.

However, NRC did not recognize the importance of the task analysis in establishing long-term educational requirements for operating personnel. Without an adequate basis--such as a task analysis for the position--NRC met considerable opposition and, as a result, changed the proposed requirements several times. Finally, in June 1981, NRC withdrew the proposal when it realized it did not have an adequate basis for its proposals and that an analysis of the duties and responsibilities of power plant operators was needed to provide that basis. Subsequently, in December of 1981, NRC began work on a job task analysis.

NRC's lack of information to use as a technical basis for establishing operating personnel educational requirements has already adversely affected and frustrated some utilities. At one power plant we visited, for instance, officials told us that NRC's attempt to develop educational requirements without an adequate basis literally scared operators at their plant and that two highly qualified shift supervisors, each with more than 25 years of power plant experience, left. Another power plant we visited had initiated a program to send groups of senior reactor operators to college but terminated the program due to NRC's uncertainty regarding the education requirements. Officials at this plant believed that safety had been compromised because an enormous amount of experience was absent while the senior operators were attending school, perhaps unnecessarily.

While the licensees we visited generally were not opposed to additional training for their plant personnel, they did want the training to be directly related to plant operations. These licensees voiced strong objections to NRC's proposed educational requirements because they believed it did not fulfill this objective.

INPO, in the meantime, recognized the importance of performing the task analysis called for in NRC's Action Plan. As a result, INPO began work on developing the task analysis in July 1980. INPO also decided, based on the results of the task analysis work, to study and determine educational requirements for operating plant personnel and thus, on its own initiative, is addressing many of the long-term actions included in NRC's Action Plan for which NRC is behind schedule. INPO expects to complete

the task analysis for all licensed operator positions by mid-1983. The status of INPO's efforts are more fully discussed in chapter 4.

In commenting on a draft of this report, NRC pointed out that it had initiated an independent job task analysis in December 1981, which will be complete in May 1983. NRC states that its task analysis and INPO's are complementary and the intent is to share the data bases. The stated objective of the NRC analysis is to (1) obtain detailed information on control room crews during transient and accident conditions, (2) provide data for evaluating human engineering design control rooms, numbers and types of operators, training requirements, personnel qualifications, procedures, job performance aids, and communications. The objective of INPO's analysis is to obtain detailed data and description of skill and knowledge requirements of 10 operational and maintenance positions for application to training program development, assessment, and accreditation.

DIFFUSE ORGANIZATIONAL STRUCTURE AND LIMITED STAFF RESOURCES ARE MAJOR CAUSES OF DELAY

The delays NRC has experienced in following up on its short-term requirements and issuing its long-term requirements are primarily attributable to two closely related causes. First, although operator error was the fundamental cause of the TMI accident, NRC did not establish--and isolate from other duties--a specific group responsible for developing long-term nuclear powerplant personnel training and qualification requirements. Instead, NRC assigned responsibility for carrying out these long-term actions to existing organizational components. Second, the NRC staff in these organizational components also had other regulatory duties to perform. Therefore, development of long-term training and qualification requirements had to compete with other regulatory priorities for limited staff resources. Shortly after NRC issued the short-term requirements, therefore, the training and qualification program began to lose priority and emphasis and implementation problems started to occur. A great deal of confusion existed in NRC as to which staff had overall responsibility for implementing certain tasks and even when responsibility was properly delegated, staff was not always assigned to perform the necessary work.

Although NRC's Action Plan specified the work necessary for each staff office or offices for implementing each task, NRC did not vest a particular office or steering group with the authority necessary to effectively monitor and coordinate implementation progress, hold responsible staff accountable, and review the adequacy and effectiveness of actions taken. This was pointed out in a report issued by NRC's internal audit group in June 1981. The report stated that, "no overall organizational structure has been established to coordinate and oversee its (the plan's) implementation or to resolve problems as they arise." The report further

stated that this situation has resulted in little coordination and a great deal of confusion as to how the plan should be implemented.

In response to these findings, the NRC Executive Director for Operations stated that responsibility for each task would be assigned and documented and that a formal tracking system would be established to monitor the responsibility, progress, and problems in carrying out the Action Plan.

Subsequently, in June 1982, the Office of Inspector and Auditor issued a follow-up report saying that management information systems have been implemented to keep management informed and that the management problems have been corrected. However, we found that the tracking system has not been very effective. For example, we contacted one official to determine the status of several tasks we were reviewing. We were told to contact another official because the tasks we wanted to discuss were not his responsibility. When we contacted this official, he said that several tasks had been transferred to his branch about 6 months earlier, and he did not know their status. In fact, he did not know for certain which tasks had actually been transferred. The Office of Inspector and Auditor, in a March 26, 1982, report, described a similar situation related to another training and qualification Action Plan task.

In addition, we attempted to prepare a table showing the original completion dates for each task in the Action Plan and the present estimated completion date. We were unable to do so because NRC's tracking system does not present clear information concerning milestones and completion dates. On the other hand, dates which do appear for some planned actions may not be realistic. This is because several divisions in NRC may be involved in performing a particular task, while one lead division, without any coordination with the others, supplies the dates for the system. Consequently, the other divisions may or may not be able to meet the time frames established for them by the lead division. In addition, several of the time frames for the planned actions were still under revision, and thus completion dates had not been established.

The second, but related, factor contributing to delay is that under the diffuse organization structure NRC used, work on long-term training and qualification tasks had to compete for limited staff resources. The Action Plan provided detailed estimates of staffing resources needed from each NRC office or division to complete each planned action. However, these were only estimates, and NRC did not require that staff be assigned for the specific purpose of implementing the actions. That is, the staff responsible for implementing these actions were also responsible for carrying out other assigned duties. For example, when NRC lifted the ban it had imposed on power plant licensing as a result of the TMI accident, licensing activity increased. NRC began requiring its staff to spend more time with licensing

functions and less time implementing the Action Plan. As a result, to date NRC has expended substantially less effort and resources than it originally planned in attempting to implement the plan. In addition, some NRC officials stated that, in retrospect, the original staff resource estimates were somewhat unrealistic because some of the tasks were more involved and time consuming than originally estimated.

In commenting on a draft of this report, NRC's Executive Director for Operations said that, given NRC's limited resources, its approach has been a reasonable one in assuring that its highest priority programs are addressed. We did not review NRC's staffing priorities and the affect other high priority programs had on developing and implementing long-term improvements in the operator training and qualification area. However, the accident at Three Mile Island was a very costly one. It has cost the utility and Federal Government hundreds of millions of dollars, had a dramatic impact on public confidence in nuclear power, and contributed, at least to some extent, to a slowdown in the growth of nuclear power. The fundamental cause of the accident was operator error and the investigations of the accident agreed about the need for improvements in operator training and qualification. Thus, we believe that NRC's long-term program for carrying out the items in the Action Plan related to operator training and qualifications should receive a high priority.

CHAPTER 4

NRC NEEDS A SPECIFIC AGREEMENT WITH INPO COVERING INPO'S COMPLIMENTARY TRAINING AND QUALIFICATION EFFORTS

INPO has assumed a leadership role in improving the capabilities of nuclear power plant control room personnel. NRC is aware of INPO's aggressive efforts in this area and intends to rely on INPO to the extent that it can for assistance in developing Action Plan requirements. NRC, therefore, is revising its own schedule for completing training and qualification Action Plan tasks to be compatible with INPO's time frames.

INPO and NRC, however, are working towards differing goals in the operator qualification and training area. INPO is developing "benchmarks for excellence" in the nuclear industry, while NRC is developing regulatory requirements which utilities and licensed operators must meet to obtain and/or retain their respective licenses. As the Federal regulator of the nuclear industry, NRC--not INPO--must ultimately decide on operator qualifications and training requirements. Therefore, to the extent that NRC relies on INPO's training and qualification work, it must be continually aware of the direction, quality, and progress of this work. To do otherwise would risk not being able to readily adapt INPO's work as support for completing the training and qualification Action Plan, thus risking additional delay in completing the plan.

On the other hand, INPO is an organization set up by and operated for utilities with nuclear power plants. Therefore, NRC must maintain an arm's length relationship with INPO even as it needs to work closely with INPO to ensure the usefulness of that organization's training and qualification work for NRC's own regulatory purposes.

In commenting on a draft of this report, NRC's Executive Director for Operations indicated that NRC recognizes the importance of coordinating more closely with INPO, has started to do so, and has signed an agreement with INPO covering general coordination of their respective activities. We believe these are steps in the right direction. However, in view of the reliance NRC is placing on INPO and the necessity of maintaining an arm's length relationship, we also believe NRC needs to establish a specific memorandum of agreement on training and qualification activities with INPO to assure common understanding among NRC, INPO, and the public as to how coordination between NRC and INPO on these activities should proceed.

INPO ATTEMPTING TO RESOLVE TRAINING AND QUALIFICATION PROBLEMS

In an attempt to improve the training and qualifications of reactor operators and other key control room personnel, INPO, on its own initiative, began work on a number of training and qualification programs that correspond to the long-term actions planned by NRC. For example, by mid-1982 INPO had developed and published a training guideline for each of the key positions at nuclear power plants. INPO believes these documents are based on the best practices currently in use in the industry and on the collective experience of the INPO staff. They are now being used extensively in the industry. INPO is also preparing a task analysis study covering all key power plant personnel positions. From the results of this study, INPO plans to develop and take specific actions in a number of training and qualification areas for plant personnel. One of these actions will be to upgrade training guidelines.

The task analysis being prepared by INPO involves analyzing the various jobs within the power plant to identify the tasks (i.e., duties and/or responsibilities) required to perform a particular job. Some of this effort has been completed for licensed operator positions. INPO is using the results to establish performance objectives for each task to develop qualification and training programs that meet those objectives. The analysis, when completed, will identify the knowledge and skills needed by all key plant personnel including licensed operators, shift supervisors, instrument and control technicians, maintenance personnel, and other plant technicians. The analysis could also serve as a principal basis for NRC's use in developing several of the remaining long-term training and qualification improvements specified in its Action Plan.

INPO expects to complete the task analysis study, including the development of training and qualification recommendations, for licensed operators by mid-1983. Job analysis for the auxiliary operator and three maintenance positions has been completed. The task analysis for these positions and the chemistry and radiation protection technicians will begin in late 1983. A job survey of training instructors has been completed and a recommended program for qualifying instructors has been developed. Instructor qualifications will serve as an integral part of the planned training accreditation process.

The accreditation program developed by INPO will be used to accredit utility industry training. The program is modeled after accreditation programs used in the educational community but is custom tailored to the nuclear industry training environment. It will include reviews of course content, training program management and organization, and instructional effectiveness. INPO will expect the course content to be based on the results of job analysis, as these results are provided.

The accreditation program will be complementary to the INPO operating plan evaluations that are already in progress. The accreditation teams will concentrate on the programmatic aspects of training while the evaluations concentrate on results, including actual operator and technical performance.

NRC WAS NOT ADEQUATELY MONITORING INPO'S EFFORTS

NRC is responsible for protecting public health and safety by establishing regulations and requirements for the nuclear industry. Because of NRC's overall workload, however, it is now relying on INPO to do much of the necessary groundwork to support the improved nuclear power plant personnel training and qualification requirements called for in NRC's Action Plan. To this end, NRC is revising its training and qualification Action Plan to reflect INPO's work. NRC is rescheduling the remaining NRC planned actions to more closely correspond to INPO's scheduled completion dates for certain actions.

According to the revised plan, NRC is relying on INPO to complete the position task analysis study and to develop guidelines for utilities to use in formulating their training programs. In addition, NRC is relying on INPO to review and accredit the utilities' programs, and evaluate their implementation. During our review, the acting director of NRC's Division of Human Factors Safety told us that NRC plans to review INPO's certification process and, once approved, accept INPO's certification of the utilities' training programs without further review. In this respect, the Director of NRC's Office of Nuclear Reactor Regulation stated in July 1982 that NRC would have no problem reviewing a generic long-term training program that might be used as a guide to everybody. This same official further stated that it would be resource intensive to review each utility's 200-page training program.

Reliance by NRC on outside parties for support for nuclear regulatory requirements is not unusual. For example, NRC uses codes and standards set by the American Society of Mechanical Engineers and the Institute of Electrical and Electronics Engineers. In the final analysis, however, judgment rests with NRC on the usefulness to nuclear regulation of standards, studies, or other work performed by others. Therefore, to the extent that NRC plans to rely on INPO to perform the groundwork leading to development and implementation of new regulatory requirements in this area of nuclear power plant personnel training and qualifications, NRC must be continually aware of the direction, quality, and progress of INPO's work. To do otherwise would risk not being able to readily adapt INPO's work as support for completing this part of its Action Plan, thereby risking additional delay in completing the plan.

On the other hand, INPO is an instrument of the industry NRC regulates. Therefore, while NRC needs to work closely with INPO if it intends to use INPO's work, it must also be sensitive to this relationship.

While NRC plans to rely on INPO's work in the training and qualification area, it has not established a specific coordinating agreement with INPO in the training and qualification area which recognizes both the importance NRC is placing on INPO's work and NRC's need to maintain an arm's length relationship with this nuclear industry organization.

Until January 1982, in fact, coordination between INPO and the NRC staff in the general area of nuclear power plant personnel training and qualification was sporadic. NRC's Office of Inspector and Auditor had found that in some instances coordination was good, but in other instances coordination either did not occur or was not as good as it appeared on the surface. This was primarily due to perceptions by NRC staff officials that the NRC Commissioners did not favor working arrangements with INPO. We also found that there was a lack of effective coordination between NRC and INPO, in the job tasks analysis area discussed above, which would give NRC a good basis for judging the adequacy of INPO's efforts in this area. The coordination that occurred consisted of meetings about every 2 months which focused on broad information exchanges, and determining whether adequate resources were being applied and whether duplication of effort was occurring, rather than monitoring the adequacy of INPO's efforts against predetermined criteria. In our view, this lack of close effective coordination demonstrated, at least to some extent, that NRC did not recognize the full significance of completing the job task analysis as a basis for implementing other long-term actions.

On January 27, 1982, however, the NRC Commissioners explicitly supported NRC coordination with INPO in several program areas, including training and qualification. Subsequently, on April 1, 1982, NRC and INPO entered into a formal memorandum of agreement for general coordination of all their respective activities. The agreement identified specific areas in which detailed agreements could be established. The specific areas include a coordination plan for accreditation and an agreement covering human factors activities. However, such specific agreements have not been developed, nor has NRC set out a timetable for their development.

In addition to the above, NRC's Executive Director for Operations emphasized to the NRC staff the need for improved coordination with INPO. This came following a meeting between the Executive Director and the President of INPO, at the latter's request, to discuss coordination of NRC and INPO activities. In this regard, according to the Executive Director, NRC is now developing a specific agreement for cooperation with INPO in the

area of NRC acceptance of INPO's operating reactor evaluation programs in lieu of NRC continuing its former program for periodically appraising utilities' operating performances.

Based on the above, it appears that NRC has recognized the need to improve its coordination with INPO and has taken some steps to do so. However, in view of (1) the importance NRC is placing on INPO's work as an integral part of NRC's long-term training and qualification Action Plan, and (2) the need to maintain a proper relationship with INPO, we believe NRC needs a specific agreement with INPO, as contemplated in the overall agreement, covering coordination of their respective nuclear power plant personnel training and qualification activities. Such an agreement, we believe, would be an effective mechanism for both maintaining NRC's independence from INPO and, at the same time, allowing NRC to continually be aware of the usefulness of INPO's work for NRC's regulatory purposes.

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

As pointed out in the investigations made of the TMI accident, qualified operators and other key personnel are essential for safe operation of a nuclear power plant. The TMI investigations identified major weaknesses in both NRC's and the utilities' programs. This prompted NRC to curtail its power plant licensing program and shift its emphasis and resources to solving the problems brought out by the TMI accident. As a result, NRC initiated a program to upgrade the capabilities of operators and other key personnel by (1) issuing several short-term requirements to provide immediate fixes for some of the problems and (2) developing a plan for making long-term improvements. The improvements in the Action Plan were developed from the recommendations made by the numerous TMI studies and, based on our earlier work, we believe the program developed by NRC, if properly implemented, would lead to improved reactor safety.

Within a year of the TMI accident, NRC issued its short-term requirements, which the utilities quickly implemented, and completed its plan for developing and implementing long-term improvements. The short-term requirements primarily provided for additional personnel in power plant control rooms, upgraded training in areas which contributed to the TMI accident, and increased the qualifications and examination requirements for operating personnel. NRC's Office of Inspection and Enforcement has verified the implementation of these actions. Thus we believe that, based on the findings and recommendations of the TMI investigations, short-term improvements required by NRC and implemented by the utilities generally address the noted deficiencies and should contribute to improved safety at nuclear power plants.

However, NRC has encountered problems and delays in following up on the adequacy of certain short-term actions and in developing and implementing the long-term improvements called for in its Action Plan. Until NRC completes these actions, it will not have done all it can to improve reactor safety in the operator qualification and training area. Since the initial accomplishments, the emphasis and attention once given the program by NRC have been lost.

First, NRC did not follow-up and promptly review the adequacy of one of the most important short-term requirements implemented by the utilities--the revised operator training programs. This review has not yet been completed. Second, NRC did not recognize the importance of completing the necessary first step in developing and implementing long-term improvements--an analysis of the responsibilities and duties of various power plant positions.

As a result, utilities were forced to develop and implement short-term training programs with little guidance or review from NRC. Consequently, although the training programs implemented by the utilities were an improvement over what existed prior to the TMI accident, some training programs were inadequate and, more importantly, some reactor operators were not properly trained.

In addition, most of the long-term training and qualification tasks and improvements planned by NRC are substantially behind schedule. The earlier that NRC completes these tasks and implements the planned improvements, the earlier it will be able to assure that operators are being adequately trained and are sufficiently qualified to operate nuclear power plants.

A diffuse organizational structure and limited staff resources were major reasons for lack of progress in carrying out the qualification and training part of the long-term Action Plan. Rather than establishing a specific group to develop long-term nuclear power plant personnel training and qualification requirements--and isolating this group from other duties--NRC assigned responsibility for developing these requirements to existing organizational components. Consequently, there was a great deal of confusion in NRC as to which staff had responsibility for developing specific requirements and which staff was not always available to perform the necessary work.

While NRC is experiencing problems and delays, the attendent impact may be lessened because INPO has taken a lead role in developing and implementing actions to strengthen and improve the capabilities of control room personnel. Although we believe that INPO's efforts in the area are commendable, we are concerned that NRC may not be doing enough to independently assure that INPO's work will be adequate for NRC's different purposes. NRC is relying on INPO to perform the task analysis, provide criteria for the utilities' training programs, review them, and certify their adequacy. However, until recently, NRC's coordination with INPO was sporadic. NRC and INPO have recently developed an overall general agreement for cooperation, and NRC has taken other steps to improve coordination, but the two entities have still not established a specific agreement for coordinating their operator training and qualifications activities. Development of a specific agreement would allow NRC to keep abreast of the direction, quality, and progress of INPO's workload and, at the same time, recognize the sensitive relationship between the two organizations.

RECOMMENDATIONS TO THE CHAIRMAN,
NUCLEAR REGULATORY COMMISSION

We recommend that the Chairman, Nuclear Regulatory Commission:

--Develop a specific agreement for coordinating NRC and INPO activities related to operator training and qualification which will permit NRC to keep abreast of the direction, quality, and progress of INPO's work while recognizing the sensitive relationship between NRC and INPO.

--Review all revised training programs developed by the utilities, correct any deficiencies before approving the programs for implementation, and audit the implementation of these programs within 1 year from the date of implementation to ensure that they are providing effective training to key control room personnel.

THE NRC EXECUTIVE DIRECTOR FOR OPERATIONS' AUGUST 6, 1982, COMMENTS ON A DRAFT OF THIS REPORT AND GAO'S EVALUATION OF THE COMMENTS

EXECUTIVE DIRECTOR COMMENT

The NRC staff has reviewed the draft GAO report entitled, "Problems and Delays Overshadow NRC's Initial Success in Improving Reactor Operators' Capabilities." The report is based on a GAO audit performed during the second half of 1981 and the early part of 1982. The staff response to the draft GAO report focuses on the Commission's present status in the areas of training and reactor operator qualifications; in general, the current status for all Action Plan items; and the current operating philosophy that exists with INPO. The results of the staff evaluation are presented below. Point by point discussion of what staff believes are inaccuracies or misinterpretations is provided in the enclosure.

The draft GAO report focuses on the Commission's efforts to respond to Action Plan items associated with the improvements of reactor operator capabilities. The Office of Nuclear Reactor Regulation (NRR) has the lead responsibility for these items and, more specifically, the Division of Human Factors Safety (DHFS) is responsible for the technological resolution of these issues. It should be noted that a significant effort has been underway since the reorganization of NRR, in 1980, to ensure that the staff is fully responsive to concerns raised following the TMI 2 accident. One should be aware that the TMI Action Plan is a compilation of a large number of items (347) which were to be resolved by the staff, following the TMI 2 accident. In the implementation of the Action Plan, the Commission has made a concerted effort to be responsive to the issues identified. Efforts such as the generation of NUREG-0737 tended to clarify selected Action Plan items. NUREG-0737 received a great deal of management attention in assuring that immediate follow-up activities were being accomplished. With time, the staff was able to move the developmental and implementation Action Plan items into the mainstream of the NRC organization. This has allowed for a very close interaction between management, staff, and industry to ensure that implementation is being attained in a timely manner. In addition to the effort put forth on the Action Plan, the staff has accomplished several other activities required to protect the public health and safety. These include: Operating Licenses reviews, Operating Reactor Licensing Actions reviews, resolution of Generic and Unresolved Safety Issues and other activities, e.g., the Systematic Evaluation Program and Clinch River Breeder Reactor review.

That staff has significant concerns regarding the conclusions presented in the draft CAC report as they have focused on selected efforts within IPFS, when, in fact, the Action Plan in total, cannot be measured by a limited review of selected activities. The staff comments on several issues raised in the draft CAC report follow.

CAC EVALUATION

As stated in the Executive Director's comment, our review addressed only the Action Plan items associated with the improvement of reactor operator capabilities. We agree that in this respect our review was limited. Therefore, we have changed our report to recognize NRC's decision to address long-term Action Plan items, including items in the operator training and qualification area, within the mainstream of the existing NRC organizational structure. As presently written, our report states that this decision led to confusion over how the training and qualification Action Plan should be carried out and inability to assign staff, which had other duties to perform, to carry out planned actions in a timely manner.

EXECUTIVE DIRECTOR COMMENT

Review of Training Program

The draft CAC report indicates that NRC has lost momentum in its review of upgraded training programs. It is true that selected training issues were not reviewed in a timely manner. However, the delays resulted from the need to use the staff to administer operator licensing examinations. It should also be noted that NRC oversight of the training programs was not totally lacking in that the results of the examination process serve as a measure of the effectiveness of training programs. In addition, the staff did review and approve INPO's generic training guidelines which served as a basis for the upgrading of licensees training programs. Upgraded training programs are being conducted by the licensees per the March 28, 1980 letter to all licensees and NUREG-0737. Our preliminary review of these programs has not shown deficiencies in the level and quality of the training, and detailed reviews conducted since January 1982 of several of the programs at operating plants have not revealed significant flaws in these programs. Thus, the training being conducted meets the intent of the Commission's reviews, even though the NRC elected to perform post-implementation reviews rather than reviewing them before implementation was authorized.

The post-implementation review process allows the NRC to remove itself from the critical path in the development and implementation of training programs that have evolved from the Action Plan. Even though NRR did not perform detailed training reviews

of licensing programs, the Office of Inspection and Enforcement has performed inspection audits as required by their inspection program.

GAO EVALUATION

We agree that limited staff resources contributed to the lengthy NRC delay in beginning its review of utilities' revised training programs. Our report recognizes that fact on page 15. In this respect, we did not review NRC's relative program priorities and the effect that its licensing program has on the objectives of the operator training and qualification program. Our review was limited to NRC's efforts to correct the most significant cause of the TMI accident.

We also agree that the NRC examination process served as a certain measure of the effectiveness of training programs. While this approach may have been convenient and expeditious for NRC, we do not believe it helped NRC fulfill its responsibilities to the public and the utilities. In fact, it caused delays in establishing improved training programs and resulted in problems for the utilities which could have been avoided.

For example, NRC required all nuclear power plant licensees to develop, implement, and submit for NRC's review within a 4-month period, a revised training program for reactor operators and senior reactor operators. The utilities complied with the requirement. However, NRC did not start reviewing these revised programs until 1-1/2 years later, and it still is not complete. In the meantime, NRC revised its operator licensing examination to include questions on the new revised areas that utilities were responsible for training their operators in. As we stated on page 12 of the report, the examination process disclosed that the revised utility training programs were inadequate and inconsistent. The overall failure rates went from 10 percent to 30 percent and a power plant in Arkansas and another in Pennsylvania had extremely high failure rates. This demonstrated that the revisions made by the utilities were not adequate to meet NRC's examination requirements.

When the failure rates increased, the utilities were forced to make additional revisions to their training programs and retrain those that failed the examination. In addition, those that failed had to be reexamined. NRC's approach to this problem resulted in inadequate training, and additional time and cost for the utilities. The entire problem could have been avoided if NRC had reviewed the revised training program in a timely manner and provided feedback to the utilities.

NRC did not start reviewing the revised programs until January 1982 and states that no "significant flaws" have been revealed. While we did not obtain information concerning NRC's review, we believe it is logical to assume that few flaws would

exist since the utilities have been revising or tailoring their programs over the past 1-1/2 years to be more responsive to the NRC examination.

While we agree that the post-implementation review process allowed NRC to remove itself from the critical path, the larger objective in this area was to improve utility training programs and, by extension, the competency of nuclear powerplant operators. Given the larger objective, we do not believe that a 1-1/2 year delay in starting the review and approving the programs is reasonable.

With respect to the comment concerning the audits performed by the Office of Inspection and Enforcement, we found during our review that these audits simply verified that a revised training program was being conducted and did not assess or evaluate the adequacy of the program.

EXECUTIVE DIRECTOR COMMENT

Long-term actions

Several Action Plan items on operator training and qualifications were identified as long-term or developmental issues because it was deemed necessary to establish the technical data to serve as a basis for resolution of these actions. The draft GAO report states that little progress has been made at implementing these items, primarily due to NRC's failure to recognize the significance of completing a job/task analysis (JTA). In fact, NRC has recognized the importance of JTA data and stressed that the industry perform such analyses as part of resolution of Action Plan item I.A.2.2. This item was the impetus for INPO to initiate their JTA, funded by the U.S. Department of Energy on a generic basis for the industry, as stated in item I.A.2.2. Further, the Office of Nuclear Regulatory Research (RES) initiated an independent JTA in December 1981 that will be completed in May 1983. The two task analyses are complementary and the respective staffs are closely coordinating the work with the intent of sharing the data bases that will be generated. An independent, verification effort will be accomplished by reviewing INPO's methods and techniques in performing their JTA. This will be accomplished by experts knowledgeable in the field of JTA and subject matter experts, such as individuals with extensive nuclear operations experience.

Several other long-term efforts are underway that relate to operator qualifications and training, both in NRR and RES. The thrust of these efforts is to establish a technological basis for the development of guidance and regulations. These efforts include the use of simulators in training and examinations, systematic approaches to training program development and review,

improved examination techniques, manpower and staffing requirements, and engineering expertise on-shift and operator qualifications. Though the long-term efforts have not yet been completed, NRC has embarked on a developmental program which will result in a technical base on which to establish rules or policy guidance as required.

GAO EVALUATION

The Executive Director states that NRC has recognized the importance of performing a job task analysis and has stressed that the industry carry out such an analysis. He also states that inclusion of an item in the Action Plan provided the impetus for INPO to initiate a job task analysis.

As stated on page 13 of the report, we acknowledge that NRC's Action Plan contained an item, which, if implemented, would have resulted in timely completion of a job task analysis. The item would have required the utilities to perform a job task analysis and provide assurance that their training programs met the position needs. Thus, to the extent that such an item was included in the Action Plan, NRC did recognize its importance in carrying out its long-term operator training program and that it was a vital link in obtaining the technical data needed to serve as a basis for other long-term actions. In this respect, NRC's actions in implementing this item do not coincide with its position as stated in its comments. According to NRC's schedule, this Action Plan item was to become a requirement in October 1980 and be completed in January 1982. The requirement, however, was never issued by NRC.

In addition, we found that there was a lack of effective coordination between NRC and INPO which would give NRC a good basis for judging the adequacy of INPO's efforts. The coordination that occurred consisted of meetings about every 2 months which focused on broad information exchanges, and determining whether adequate resources were being applied and whether duplication of effort was occurring rather than monitoring the adequacy of INPO's efforts against predetermined criteria. In our view, this lack of close effective coordination demonstrated, at least to some extent, that NRC did not recognize the full significance of completing the job task analysis as a basis for implementing other long-term actions. It is not certain whether, as NRC contends, the Action Plan item provided the impetus for INPO to initiate its task analysis. What is certain is that NRC took little or no action beyond placing an item in its Action Plan to implement this requirement. Nevertheless, INPO did take the lead and initiated the work which is being funded by the U.S. Department of Energy, in mid-1980.

The Executive Director states that NRC initiated an independent job analysis in December 1981 which will be completed in May 1983. Also, that the two major job analyses are complimentary and, contrary to what we found in our review, are being closely coordinated and that other long-term efforts are now underway.

In general, we believe that the comments on this issue indicate that, after withdrawing its proposed educational requirement in July 1981 due to the need to first complete a job task analysis, NRC recognized the significance of INPO's work and has now begun to develop a program to coordinate with INPO. NRC also apparently now plans to review INPO's methods and techniques used in developing the job task analysis. These plans, if carried out, should place NRC in a better position for evaluating the adequacy of INPO's work than we found during our field work. We, therefore, revised our report to recognize these NRC plans.

EXECUTIVE DIRECTOR COMMENT

Organizational structure

In discussing the organizational structure for managing the Action Plan, it is important to note that the Action Plan tasks are divided into (1) implementation items, those approved for imposition on licensees (NUREG-0737 items), and (2) developmental items, those still in the phase where the staff is developing a technical resolution to the item and/or a regulatory position. The Division of Licensing (DL), NRR, was assigned responsibility for all implementation items through the NRC licensing project manager. These items are implemented on a plant specific basis with oversight by licensing management. The process is tracked through the Operating Reactor's Licensing Action Tracking System (OPLAS) Summary Report which is published monthly. The Operating Reactor Assessment Branch, within DL, also acts as agent for managing, coordinating, and reporting on implementation action items. Over 72% of about 6,000 Action Plan licensing actions have been implemented by the industry and about 50% of these items have been reviewed by the staff. The post-implementation review mechanism has proven successful in that it allows the licensees to implement programs prior to formal review and approval by the Commission. For items where certain licensees feel that enough guidance is not provided in the Action Plan or other NRC documents, the project manager provides additional guidance.

Management responsibility for developmental items has remained in the various offices assigned responsibility for the tasks, with the Action Plan Tracking System (published quarterly) serving as the central management information system. Current efforts within NRC are aimed at integrating TMI Action Plan developmental items with Generic Issues, Unresolved Safety Issues, and all other related areas requiring NRC or industry resources. The developmental items are therefore being reassessed and prioritized by

the Division of Safety Technology. Given limited resources, we believe this is a reasonable approach to assuring that the highest priority agency programs are addressed.

Each office has designated an Action Plan coordinator to serve as a contact for Action Plan management, to coordinate within their own offices and with other offices and to exercise quality control over data provided to the Action Plan Tracking System. The Action Plan Coordinators are specifically charged with keeping the Executive Director for Operations informed of any problems in the Action Plan needing management attention.

GAO EVALUATION

We agree that, for the most part, NRC is doing a good job managing the implementation items as they relate to efforts to improve operator training and qualifications. These are short-term actions that were to be implemented rather quickly. Our report recognizes that NRC's efforts were good.

Regarding the developmental, or long-term actions, however, the comments merely restate NRC's decision to implement these actions within its existing organizational structure. This decision by NRC management, as pointed out in our report, led to confusion over how the training and qualification Action Plan should be implemented and inability to devote the level of staff resources called for in the Plan--due to competing demands on staff time--to carrying out the Plan. As a result, long-term actions--at least as they relate to operator training and qualifications--are not being implemented at a pace anywhere close to the timetable spelled out in the Action Plan.

The adequacy of the tracking system, used by NRC to provide cental management information on developmental items, is discussed in our evaluation of the following comment.

EXECUTIVE DIRECTOR COMMENT

Management of the Action Plan

GAO correctly notes, in the draft report, that NRC's Office of Inspector and Auditor issued a June 1981 report commenting on the need to improve the management of the Action Plan's implementation. GAO does not note, however, that on June 17, 1982, OIA issued a follow-up report on its June 1981 report. OIA's follow-up review is the most recent assessment available of NRC's management of the Action Plan. OIA's June 1982 report concluded that:

> Significant improvements have been made in the management of the TMI Action Plan's implementation since issuance of our June 1981 report. Management responsibilities have been clarified; management--from Division Directors in NRR up through the Commission--is aware of the progress and problems

in implementing the Action Plan; management information systems have been put in place and are functioning to keep management informed; and interoffice coordination, especially between NRR and IE, has been significantly improved. In short, the management problems identified in our June 1981 report have been corrected.

CIA's June 1982 report further states that while every problem with the Action Plan's implementation has not been solved, the management systems in place, especially the various tracking systems, are adequate to identify problems so that management can take appropriate corrective actions. Specifically the tracking systems accepted by NRR include:

CPLAS - status of Action Plan Items being Implemented.
APTS - status of Action Plan Items under Development.
LATS - status of work items being performed by contractors.

The staff recognizes that since issuance of the Action Plan, various problems have been experienced in its management. The need for improvement was recognized in the NRR Director's January 7, 1981, memorandum to Division Directors, in CIA's June 1981 report and in the EDO's June 3, 1981, memorandum to office directors on Management of the TMI Action Plan. We believe, however, and CIA's June 17, 1982 report confirms the belief that a management system is now in place to implement the Action Plan effectively and efficiently.

GAO EVALUATION

We disagree with the above comment. We also question the Office of Inspector and Auditor's report conclusions that the management problems have been resolved. We hold this view because, under the present organization, there still is no one person or group assigned the responsibility or authority to oversee the development and implementation of the long-term actions. Consequently, if two or three NRC offices are involved in developing a single task and the completion of the task is dependent on each office performing its work on a timely basis, there is no centralized authority to set schedules and priorities.

The basis for our disagreement also stems from the Office of Inspector and Auditor's apparent reliance on the tracking system as evidence that management has improved. We found that APTS--an Action Plan tracking system designed to give the status of Action Plan items under development--was not adequate for managing NRC's efforts. As stated on page 16, the system does not present clear information concerning dates. In addition, several of the planned actions listed in the tracking system do not even show a completion date, let alone intermediate milestones, etc. We believe it will be difficult for NRC management to identify problems using the present "in place" tracking system.

While the above Executive Director comment properly characterizes NRC's Office of Inspector and Auditor's report concerning the NRC tracking systems, the report also lists the shortcomings of each reporting system. In this report regarding the APTS or developmental item tracking system, the report stated that:

> "The APTS report had not been issued between September 1981, and April 1982, because changes were being made to the data base. A new APTS had been prepared but it was being held pending the approval of a SECY paper involving the rebaselining of over 60 items in the APTS. When the rebaselining was not approved, the report was changed back to its old data base and issued on April 1, 1982."

We did not assess the adequacy of the other two systems mentioned because all of the long-term action items for improving operator capabilities are under development.

EXECUTIVE DIRECTOR COMMENT

Interaction with INPO

The draft CAC report states that the NRC is relying on INPO to resolve many of the long-term Action Plan items and that NRC is not adequately monitoring, reviewing, or evaluating INPO activities. The facts do not support these contentions. With regard to INPO assuming responsibility for long-term action, the NRC looks to INPO, as well as other industry groups, (e.g., Edison Electric Institute, Electric Power Research Institute, Atomic Industrial Forum and the American Nuclear Society), as resources for industry data and information that are used in developing responses to Action Plan items. NRC does monitor, review and evaluate INPO efforts both through informal cooperation and a formal Memorandum of Agreement which became effective April 1, 1982.

Two examples given in the draft CAC report are task analysis and accreditation of training programs. In both of these instances INPO was specifically identified in the Action Plan as a potential source of information or action. Further, both of these programs are being closely monitored by NRC. A complementary task analysis program is underway sponsored by FFS and NFP. NFP is preparing a status report on accreditation based, in part, on the review of several drafts of the INPO Accreditation Program. The April 1, 1982, Memorandum of Agreement between INPO and NRC states:

> "NRC will consider and, to the extent appropriate, factor into its Rules and Regulatory Guides the information and recommendations provided by INPO. Further, INPO and the NRC agree to consult with each other with regard to the availability of technical information that would be useful

in areas of mutual interest; and to promote and encourage a free flow of such information, if not otherwise restricted from further distribution...."

A specific example of a program that is being developed under the Memorandum of Agreement relates to NRC acceptance of the INPO Evaluation Program for Operating Reactors, in lieu of IE Performance Appraisal Team inspections. The agreement, which is still under development by the staff, provides for NRC: to accompany INPO on evaluation trips, to receive copies of all INPO evaluations, and to visit INPO for status briefings. Further, IE will continue to perform 2-3 independent evaluations each year to evaluate the effectiveness of the INPO program.

The draft CAC report also states that NRC relies on a contractor, CFNL, and a peer review group to monitor INPO. In fact, NRC did direct CFNL to work with INPO on a specific project because INPO possessed data needed for that project, and the NRC technical monitor routinely reviewed work performed by both CFNL and INPO. With regard to the peer review group, INPO requested the opportunity to address this group, which was established to review the issue of operator qualifications, and some review group members visited INPO to review the task analysis effort, but the group was not monitoring INPO.

It should be noted, as in the draft CAC report, that there is a difference in goals of INPO and NRC. While INPO attempts to develop "benchmarks for excellence" in the nuclear industry, NRC must develop minimum standards.

Also on March 26, 1982 the CIA issued a report to the Commission entitled "Review of NRC's Efforts to Develop a Relationship with INPO." The report related the results of CIA's work from May to August 1981 and provided an update based on additional efforts in January 1982. CIA's report stated that in some areas, NRC's efforts at coordinating with INPO had been good, but that there were other areas where improvement was needed. However, CIA goes on to say that based on its additional work, (in January 1982) "the problems identified during the audit either have been or are being resolved...."

CAC EVALUATION

The Executive Director states that the facts do not support our contention that (1) NRC is relying on INPO to resolve many of the long-term Action Plan items and (2) NRC is not adequately monitoring, reviewing, or evaluating INPO activities. We disagree. In our view, the following NRC actions demonstrate that it is relying on INPO for carrying out the action items related to operator training and qualifications:

--After several unsuccessful attempts by NRC to establish reactor operator and shift supervisor educational requirements, NRC requested INPO to

accelerate its job task analysis and provide NRC the technical information or basis for establishing the requirements.

--NRC has admittedly revised its schedule on several long-term Action Plan items to more closely reflect INPO's schedule.

--An NRC contractor is using INPO data to help in revising the NRC licensing examination process. NRC directed the contractor to work with INPO because INPO possessed the data needed for the work.

We are not criticizing NRC for relying on INPO. We believe such an approach is reasonable and helps free up NRC resources to carry out other important functions. Such an approach is reasonable, however, only if NRC adequately monitors INPO's actions. We believe that adequate monitoring is critical if NRC is to effectively exercise its independent regulatory responsibilities. We found during our review that NRC was not adequately monitoring or coordinating with INPO in the important job task analysis area. Nevertheless, the Executive Director's comments concerning the monitoring, reviewing, and evaluation of INPO's work indicates NRC now recognizes the problem and is taking action.

The Executive Director's comment quotes a report by NRC's Office of Inspector and Auditor which addresses the NRC/INPO coordination problem. The report supports our findings that little or no coordination existed until early 1982. It states however, that "the problems identified during the audit either have been or are being resolved * * *." The audit report discloses two positive events which we agree are important steps toward correcting the problem.

First, on December 14, 1981, the NRC's Executive Director for Operations asked the NRC office directors to have their staff initiate discussions with INPO to improve relations and develop agreements to cover coordination in programmatic areas. Second, on January 27, 1982, the Chairman of the Nuclear Regulatory Commission distributed a policy guidance paper emphasizing the need for coordination between NRC and INPO. According to the audit report, this document provides a clear statement as to how the Commission believes NRC and INPO coordination should proceed.

We are pleased with NRC's action and have changed our report to reflect these efforts. However, while NRC is making progress, we still believe that a specific coordinating agreement regarding operator training and qualification is needed to assure common understanding between NRC and INPO as to how coordination between them should proceed, given NRC's heavy reliance on INPO's work and the need to maintain an arm's length relationship with that

nuclear industry organization. Contrary to the Executive Director's comments, an agreement for coordination between NRC and INPO covering the areas addressed in this report has still not been developed. The April 1, 1982, Memorandum of Agreement cited in the NRC comment is a general agreement for coordination under which specific agreements are to be developed, including a coordination plan for accreditation and an agreement covering miscellaneous human factors activities. Such agreements have not been developed, and until they are, a firm basis does not exist for proper and effective coordination between NRC and INPO.

EXECUTIVE DIRECTOR COMMENT

Summary

In summary, we believe that the draft CAC report is misleading. DHFS has undertaken an extensive programmatic effort to upgrade the human factors concerns resulting from TMI. Specifically: control room upgrading (NUREG-0700), the Safety Parameter Display System (SPDS), Emergency Operating Procedures (NUREG-0799 and NUREG-0899), modifications to the operator licensing examinations process (March 28, 1980, letter) and other licensing examination improvement efforts in mid FY-82, analysis and upgrading of management guidelines and the development of a draft Training Program Plan are all efforts directed toward the enhancement of safety at operating nuclear power plants. These efforts are being factored into a comprehensive, well-focused Human Factors Program Plan. We believe that it is clear that the staff has indeed moved vigorously to be responsive to the issues surrounding operational safety while attempting to be responsive to the issues raised in the Action Plan.

CAC EVALUATION

We disagree that our report is misleading. The information contained in our report was obtained by interviewing officials at NRC headquarters, NRC's Region I office, INPO, five nuclear power plants and five different utility companies. We believe our findings, conclusions, and recommendations are supported by the contents of the report.

The report recognizes that NRC took immediate action to implement short-term improvements. However, we do not believe it has "moved vigorously" to implement long-term operator qualification and training action items. The fact is that it has been 3-1/2 years since the accident at TMI and 2-1/2 years since NRC issued its short-term requirements and published its approved Action Plan. Yet, since then NRC has not implemented even one long-term action contained in the plan which would correct one of the most significant causes of the TMI accident--operator training and qualification.

In our view, the fact that NRC is just now in the process of developing a draft training plan, and that these efforts "are being" factored into a comprehensive program plan, supports the fact that NRC has been slow in implementing actions in this area and currently does not have a "well-focused" program in place. On the other hand, we are encouraged by recent NRC actions and believe that, if implemented and continued, they will result in long-term improvements in nuclear power operator training and qualifications.